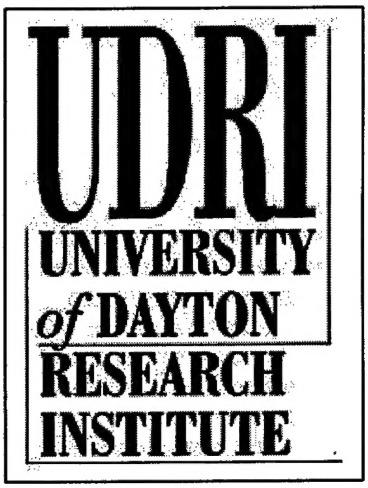

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SEARCH & SUMMARY REPORT

AFTER ACTION REVIEW (AAR) TAKE-HOME PACKAGE (THP) EVALUATION (Volume I)

January 1999

Christopher R. Taylor
Human Factors Engineer

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Prepared for

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UDRI
UNIVERSITY of DAYTON RESEARCH INSTITUTE

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13. ABSTRACT *(Maximum 200 Words)* This report was commissioned to determine whether evaluations of military training After Action Review (AAR) Take-Home Packages (THPs) have been documented in the scientific and technical literature. Focusing on AAR- and THP-related documents since 1987, the UDRI Human Factors Group identified only one document explicitly reported on the THP effectiveness during this period. Fobes and Meliza (1988) reported a survey of commanders of several echelons from three divisions rotating through the National Training Center (NTC) on the effectiveness of the standard THP. While their finding was based on technology available at that time, and the sample size and location are limited, the observations on need for improvements to THPs may still be applicable to current generation THPs. New PC-based graphics and available Internet connections could advance the capabilities and effectiveness of THPs. Lacking a current study of THP effectiveness, and since considerable effort is expended to produce THP products and much could be gained from effective THPs, it seems appropriate to conduct a new study of THP effectiveness to identify specific improvements needed for this training product. This proposed study could survey live, constructive, and simulation exercises participants regarding the usage for each THP product, most effective THP methods, and desired improvements and configurations that would encourage field use. This volume presents the narrative highlights of the search findings.

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TABLE OF CONTENTS
Volume I

TABLE OF CONTENTS
Volume II

LIST OF FIGURES

EVALUATION OF AFTER ACTION REVIEW TAKE-HOME PACKAGES

A UDRI "Search and Summary" Technical Report

1. INTRODUCTION

1.1 Background

According to current training doctrine, the Army must "train as it fights." To accomplish this goal, the Army is training its force in the most realistic and cost-effective manner possible. An integral part of the training is the After Action Review (AAR) which provides training units an opportunity to review successes and areas needing improvement after a training scenario. AARs allow trained observer/controllers (O/Cs) and the AAR leader to conduct a Socratic learning session following training exercises to facilitate participants learning from their exercise experience—to understand which tasks were accomplished according to standards and those that were not and why. The AAR is an integral part of the training to ensure that the lessons learned during the exercise are effectively presented and corrective actions are taken. The overall philosophy is: "Body bags is not the way to learn—let us learn now from each other." (Combat Maneuver Training Center [CMTC], 1998) The effectiveness of certain AAR processes has been widely recognized by the Army.

> After Action Reviews (AARs) promote Army readiness. In recent years, operational AARs have been refined and matured at the Combat Training Centers (CTCs) and Battle Command Training Program (BCTP). AARs properly performed in a non-attribution environment where pride is left at the door minimize doubt in the leader's mind as to why operations succeeded or failed. Tactics, force structure, technology, and weapons in addition to warfighting skills have all benefited from the AAR. Doctrinally, the AAR is now an integral part of military training. (TRADOC Project Integration Office-Synthetic Environment, 1997, p 1)

1.2 Take-Home Package (THP) Definition

Like the AAR, the THP is an essential part of the overall exercise. The THP reinforces lessons learned from the exercise and discussed in the AAR. THPs also provide commanders with a plan to develop home station training. The THP is a tool that allows units to continue learning from a previous exercise. In essence the THP is a compilation of the body knowledge presented in the AAR with the addition of specific comments from the O/Cs, present during the exercise. "The unit is provided with take-home materials, which include the O/C comments, unit performance data, and videotapes of the after action reviews. This take-home package will be used at the home station to plan future (1 year - 18 months) training." (Joint Readiness Training Center (JRTC), 1998a)

1.3 THP Contents

THPs consist of information and an expected review process used by the military in an attempt to extend the usefulness of the lessons learned from unit training exercises. Currently no standardized system exists for developing AARs and THPs, as indicated in the STAARS Handbook version 2.1 (Department of the Army (DA), 1997a). This lack of standardization has resulted in several different data formats for THPs being used. At one end of the spectrum THPs can be as simple as a Microsoft Excel spreadsheet containing information generated from O/C notes, taken while a unit completes an assigned series of training tasks, also known as a training table. At the other end of the spectrum, the newer training systems (live and simulation) are capable of automatically compiling most of the relevant data collected during training exercises into AAR and THP products. These data may include video clips, radio transmissions, times, and relative locations of component units. This type of computer-generated and tracked data is generally found in THPs from simulation exercises. The Army is attempting to make this type of data available to the participants of live-exercises through several different programs such as the following:

- **SINGARS Monitor and Control Subsystem** "This subsystem will monitor, collect, time tag, and store radio traffic for incorporation into AARs and THPs." (STRICOM, 1998)
- The **SAWE-RF/MILES II** (Simulated Area Weapons Effects - Radio Frequency/Multiple Integrated Laser Engagement II) incorporates Global Positioning System (GPS) data with the Core Instrumentation System (CIS) data to provide real-time battle tracking and casualty assessment, as well as having the advantage of live video feeds from the battlefield for use in AARs and THPs. (CMTC, 1998)
- The **Joint Readiness Training Center (JRTC), Ft. Polk.** The JRTC Instrumentation System will provide for real-time video, position location, and small arms engagement data to analysts and the observer controllers. The result will be accurate and immediate data to provide to the analysts for improved AARs and unit THPs." (JRTC, 1998b)

1.4 Purpose and Scope

> THPs capture the tactical essence of our Army, providing snapshots of the state of training. In providing unit feedback, no other method has been as successful in giving the Army a clear assessment of its potential (Scudder, 1994, p 31).

Although Army leaders recognize the potential value of THPs, there seems to be considerable discussion as to their usefulness (Crissey, Dr. Mona, personal communication, August 6, 1998). Therefore, Simulation, Training and Instrumentation Command (STRICOM) requested UDRI to conduct a *Search and Summary* to determine whether the effectiveness of THPs has been evaluated in the scientific and technical literature.

1.5 Overview

After reviewing the approach used in this *Search and Summary*, this report highlights typical THPs, their contents, and differences in content with respect to organizational level, and live versus simulation exercises. Then it presents representative AAR and THP systems that illustrate current capabilities. Finally, the report concludes with a summary of findings for all identified literature that presents evaluations of THPs.

2. APPROACH

The University of Dayton Research Institute (UDRI) Human Factors Group conducted an extensive search of military, government, commercial, and World Wide Web (WWW) databases to locate resources related to the effectiveness of military training THPs. The formal search consulted numerous government and commercial databases. Additionally, searches were conducted via the World Wide Web to locate resources not available in the aforementioned databases. The scope of this preliminary study, however, did not allow for resources to conduct interviews or surveys of the creators and end-users of THPs.

2.1 Literature Search Process

The main thrust of this project consisted of searching available resources for items related to THPs and their effectiveness. Toward this end, we conducted a search via the Defense Technical Information Center (DTIC) and the web to find any literature available. Since AAR technology has changed so much within the last eight years, our literature search focused on documents dated 1987 or later, though an occasional reference is made to earlier documents. A complete listing of the databases search for this project are listed below; however all pertinent citations came from the DTIC family of databases and WWW searches.

- DTIC CD-ROM
- DTIC Defense RDT&E Online System (DROLS)
- National Aeronautics and Space Administration (NASA) Recon
- iDialog, and
- PsycINFO
- Education Abstracts
- Dissertation Abstracts
- Compendex

In addition to these databases UDRI-HFG searched the WWW by querying most of the established Internet search engines, using the keywords listed below.

2.2 Keywords

The initial search, conducted in November 1998 by UDRI analysts and the UDRI Technical Information Service Office, focused on identifying documents concerning military training AAR THPs and their effectiveness. Keywords used include the following:

- Debriefing or Critique
- After Action Review or AAR
- Take-home Report, Take Home Report, Take Home Package or Take-Home Package (THP) (Note: used both the unit modifier "take-home" and separate words "take home")
- Performance assessment
- Evaluation report
- Performance critique
- Effectiveness (of THPs)

Analyzing the results from the initial search allowed us to narrow the search. This resulted in searches on specific US Army training systems and any studies conducted in the AAR area. Once the information was taken from the initial search, we concentrated on specific systems within the US Military, focusing primarily on the Army, such as the following *(presented alphabetically):*

- Automated Training Analysis and Feedback System (ATAFS)*
- Aviation Reconfigurable Manned Simulator System (ARMS)
- Battle Command Training Program (BCTP)
- Brigade Operation Display and After Action Review System (BODAS)
- Combat Training Center Archive
- Combatant Command Training (CTC)
- Corps Battle Simulation After Action Review System (CBS AARS)
- Digital After Action Review Technology (DAART)
- Joint Task Force Training Program (JTFTP)
- National Training Center – Objective Instrumentation System (NTC-OIS)*
- Simulation Training Integrated Performance Evaluation System (STRIPES)
- Standard Training Assessment & Reporting System (STARS)
- Standardized Army After Action Review System (STAARS)
- Training Analysis Repository and Graphical Evaluation Toolset (TARGET)*
- Unit Performance Assessment System (UPAS)*

Since there are many systems in use by the Army to conduct training and training support functions, this *search and summary* presents highlights of a few of the more widely used systems. We researched and summarized the AAR and THP capabilities for representative systems (* systems presented are asterisked). We presented these systems to provide the background needed to determine the composition of effective THPs. Finally, we summarized the few papers in the literature that address any type of evaluation of the effectiveness of THPs. The results of the search are summarized in Volume I of this report, and the literature search results including citations and abstracts are contained in Volume II.

3. FINDINGS

The findings are presented in terms of the purpose, contents, and other issues surrounding THP content; sample AAR and THP systems that illustrate today's THP development capability; and research findings on the effectiveness of THPs.

3.1 Current THPs

After highlighting the purpose and typical content of today's THPs, we will discuss differences between THPs based on the organizational level of participants and whether participation was live versus simulated.

3.1.1 Purpose

As discussed in the THP definition (see Section 1.2) the Army uses THPs in the following roles:

- Plan future training (JRTC, 1998a)
- Support Lessons Learned from AARs
- Provide feedback on important issues not discussed during AARs (i.e., because of time limitations at the training exercise site)
- Identify and analyze data trends across exercises (Meliza 1995)

The various training environments (live, simulation, and constructive) all attempt to use the THP in these roles. Reinforcing lessons learned during the exercise, the AAR is designed to emphasize the important factors affecting the exercises, such as what happened, why it happened, and how can it be corrected (DA, 1997b). After the AAR has been presented, the THP is designed to allow units to bring the valuable information learned at the exercise back to home base. THPs provide units with feedback from experienced observers, unit performance data, and videotapes of AARs, allowing units to train on the lessons learned from the exercises.

> Through the THP, O/Cs provide a wealth of information on each unit's performance status. Unfortunately, however, the full benefits of the feedback information are not realized. At the unit level, brigade and battalion commanders typically move to other assignments before they design training to sustain strengths and correct weaknesses; and their replacements are frequently disinclined to work through previous THPs to extract the detailed evaluations they contain. (Ford, Huffman, & Creen, 1996, p 1)

3.1.2 Contents of current THPs

At this point in time the AAR process has not been standardized. As stated in the final coordination draft of the STAARS master-plan,

> Today, there are no standard Army system protocols to capture AAR data/information. To support AARs, many training systems can capture, store, and retrieve relevant data/ information. In some cases, stand-alone AAR systems were developed in conjunction with the Training Aids, Devices, Simulators, and Simulations (TADSS), while in others, AAR systems were added later. Most current AAR systems facilitate training feedback to the unit. (DA, 1997b, p. 1)

This lack of standardization also affects the THPs produced. Even so, THPs tend to consist of some common components, including

- objective data,
- subjective data, and
- video and audio portions.

Examining the various THP systems, UDRI-HFG identified sub-items, which often occur in THPs, falling roughly into the broad categories listed below:

- **Objective data**
  - Ordinance measures
    - Shots fired
    - Hits
    - Misses
    - Near Misses
    - Kills
  - Casualty reports
    - Killed
    - Wounded
    - Ratio Friend/Enemy kills
  - Location data
    - Map coordinates
    - Proper formation
    - Proper intervals
    - Movement discipline
    - Proper turret and hull orientation (armor units)
- **Subjective data**
  - Notes on O/C interference during force-on-force engagement
    - Exercises stopped and reran due to mid-exercise coaching
    - O/C assessed casualties
    - Notes on proper radio procedures
    - Any areas not covered by other sources
  - O/C summary comments
    - Overall strengths
    - Overall weaknesses
    - Unit Attitude
    - Subjective comments
    - Any points not covered by other sources
- **Video and Audio Portions**
  - Communications logs
    - Contact reports
    - Spot reports
    - Proper reporting procedures
    - Unit crosstalk
  - Videotapes, video capture, and video logs
    - Videotapes of AAR conducted throughout exercise
    - Videotapes of 2-D or 3-D maps from simulation
    - Videotapes of engagements (some force-on-force areas)
    - Video capture or replay from computer simulation

3.1.3 Organizational Level of THP

The information in each THP differs according to the unit's organizational level (e.g., A command post THP will not be concerned with the deployment of individual tanks or even platoons, but will need to be informed on the effectiveness of the deployment of higher-level units. Conversely, platoons are not concerned with the operations within the command post; therefore the types of information need to be tailored to the unit.) The Army's goal is to adjust the information in a THP to the level that the unit requires for the exercise involved, but to keep the information in THPs consistent across the different types of training. As stated in the STAARS Action Plan, AARs and THPs should contain "standardized products generated in or a combination of the live, virtual, and constructive environments will be identical or nearly identical for each echelon receiving the AAR." (DA, 1997b) (See Figure 1.)

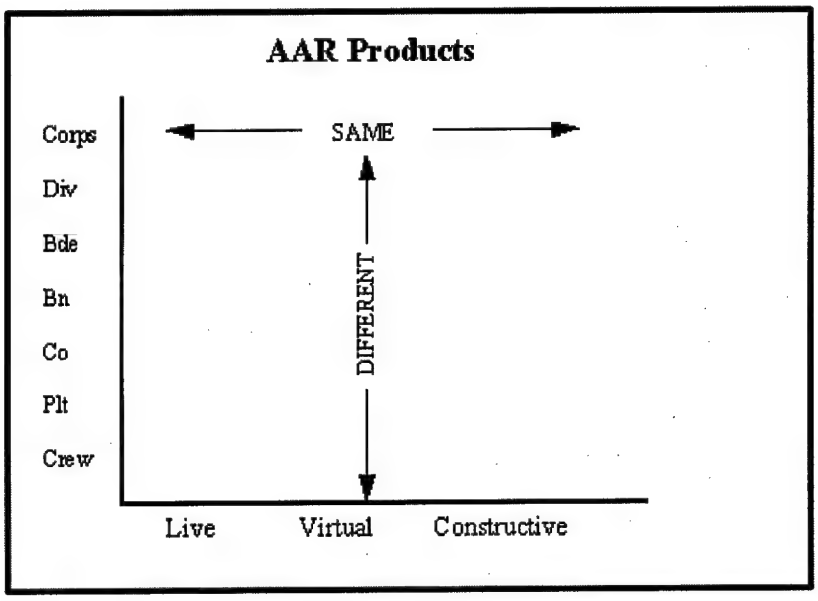

FIGURE 1. Information Consistency in THPs
(Source: Annex F, Standard Army After Action Review System, to OPORD 1-95 Department of Army, 1995 Available: http://www-dcst.monroe.army.mil/wfxxi/opanx-f2.htm)

3.1.4 Live vs. Simulation: Differences in THP contents

Several differences between live versus simulated training environments have been documented in the literature that may have a bearing on AAR and THP content and O/C actions. This section highlights these considerations. As indicated in this quote from Annex F, OPORD 1-95 (below), the ultimate goal of the Army is to create AAR products that are consistent across the training spectrum (live, virtual, constructive and STOW), it appears that differences still exist.

> Clearly, the data necessary to support an infantry company (Co) AAR will be vastly different than that necessary for a division level AAR; however, there is no reason that all company level AAR products cannot be standard, no matter whether the training event takes place at the National Training Center (NTC) or in a simulation. (DA 1995b, Pg. 1)

3.1.4.1 Data

The data collected in the three training environments could differ in type and volume. The data available in the virtual environment, being automated, is much more comprehensive with respect to each entity in the exercise for example, gun tube orientation is readily available in the virtual world, but may not as readily available in the real world (Meliza, 1996 pg. 19).

> Information about the status of entities, including information about where the gun tube of a tank is pointed at a specific moment, is readily available and accessible in the virtual environment. In the live

> environment, update rates on such aspects of entity status as vehicle location are slower than in the virtual world, and some types of information (speed of entities and orientation of gun tubes) are unlikely to be provided in the near future. (Pg. 19).

3.1.4.2 Role of O/C

Another difference between the live exercises and simulation environments is the role played by the O/C. In the virtual environment the O/C records notes on how units progress through established training tables, but has little interaction with the conduct of the training table, other than changing the difficulty level as the situation dictates. In the live environment the O/C plays a much more active role, evaluating, controlling, and interacting with participants throughout the exercise. By contrast, in live simulations, the O/C may need to intervene for actions that the simulation will perform automatically. For example, the O/C may need to "kill" participants in a live exercise when they are "protected" by artificial barriers, thereby directly affecting the exercise outcome, as seen in this example of MILES lasers in action in the live environment requiring active intervention by O/Cs.

> MILES lasers will not penetrate minor obstructions. Tree leaves ("tree-leaf defilade") will obstruct the laser. Firing positions with berms ("MILES berms") that are inadequate to stop penetration by real ordnance will stop a MILES laser beam. Smoke and dust precludes the effectiveness of the laser and may preclude engagements at maximum range. For safety, JRTC rules of engagement preclude the use of MILES by dismounted soldiers for close-in engagements at less than 10 meters. OCs manually perform exercise control using laser pistols (control guns) in those instances where MILES fidelity limitations or safety preclude automatic casualty and battle damage assessments. (Brown, Nordyke, Gerlock, Begley, & Meliza, 1997, pg. 16)

As technology improves, the differences in data collection between the environments may become smaller and the Army's goal of AARs and THPs that are consistent across environments might become reality.

3.2 Summaries of Selected Systems

To give the reader a flavor of the functions provided by today's AAR and THP systems that can be used to develop improved THPs, we have highlighted capabilities of the following systems: Unit Performance Assessment System (UPAS), Automated Training Analysis and Feedback System (ATAFS), Training Analysis Repository and Graphical Evaluation Toolset (TARGET), and National Training Center Instrumentation System (NTC-IS). These systems illustrate the capabilities that are now available for THP development.

3.2.1 Unit Performance Assessment System (UPAS)

A pioneer AAR support system, UPAS is the first-generation, automated, personnel-computer (PC)-based AAR preparation aid that can also support THPs. It facilitates the creation of AAR and THP aids by automatically collecting selected data generated during an exercise. The AAR aids created for UPAS have been incorporated into the next generation of AAR and THP preparation systems.

UPAS can migrate scenes from an exercise into an AAR or THP, enabling the unit to continue training on the lessons learned during the exercise. UPAS operates "on top of" the Simulation Networking (SIMNET) system in place. UPAS collects data from the SIMNET exercise, then after the data is collected, can be used in stand-alone mode (without needing further SIMNET interface) to assist in evaluating unit performance. UPAS is designed to

- collect data broadcast over the network (vehicle location, vehicle status, and firing events);
- filter and organize the data to support rapid analysis;
- load data into a relational database patterned after the National Training Center (NTC) database;
- integrate broadcast data with unit planning and terrain data; and
- provide graphic and tabular displays of data to support unit performance analysis and performance feedback. (Meliza & Tan, 1995, pg. 1)

UPAS facilitates the creation of AAR and THP by displaying data in a manner that supports animated figures, static figures, and tables that can be used to illustrate key training points to exercise participants. These data are shown in several different displays: Plan View Display, Battle Flow Chart, Battle Snapshots, Fire Fight Display, Exercise Timeline, and graphs and tables.

All available data in the simulation environment could be included in an AAR or THP; however, the challenge is to limit data presented to that most essential for training. Most data needed can automatically be loaded from the simulation into UPAS; however, there are some exceptions. During an exercise the O/C may need to annotate individual start/stop/restart times to be included in the AAR and THP. Also, the inter-unit communications used during the simulation are not available to the O/C in computerized form. Therefore, "A data collector will be required to collect communications data and load it into UPAS in order to use the communications portion of the Exercise Timeline." (Meliza & Tan, 1995, pg. 65) Consequently, the O/C must keep a hand-written log of all pertinent communications. The types of communications are added onto the Event Timeline. In addition to making O/C notes on the unit's communications, the O/C may also input notes to be added to each of the different types of displays for inclusion into the AAR and THP. The UPAS capability for creating THPs consists of a utility to capture screen images of pertinent maps or AAR slides that can be loaded onto a disk for reviewing at the unit's home station.

3.2.1.1 Plan View Display

The Plan View Display (see Figure 2) shows the exercise from a two-dimensional overhead perspective. The exercise area is displayed as a grid map with terrain features such as elevation, trees, water, roads, and buildings. Participating units are shown on the grid map as picture icons indicating unit type (e.g. ground vehicle, dismounted infantry, rotary wing, and conventional aircraft), with the Unit Control Measures listed in yellow text. Unit icons are also color-coded corresponding to status (e.g. operational or destroyed). The Plan View Display may be an animated display showing the time-flow of the engagement or a snapshot of any moment in the exercise.

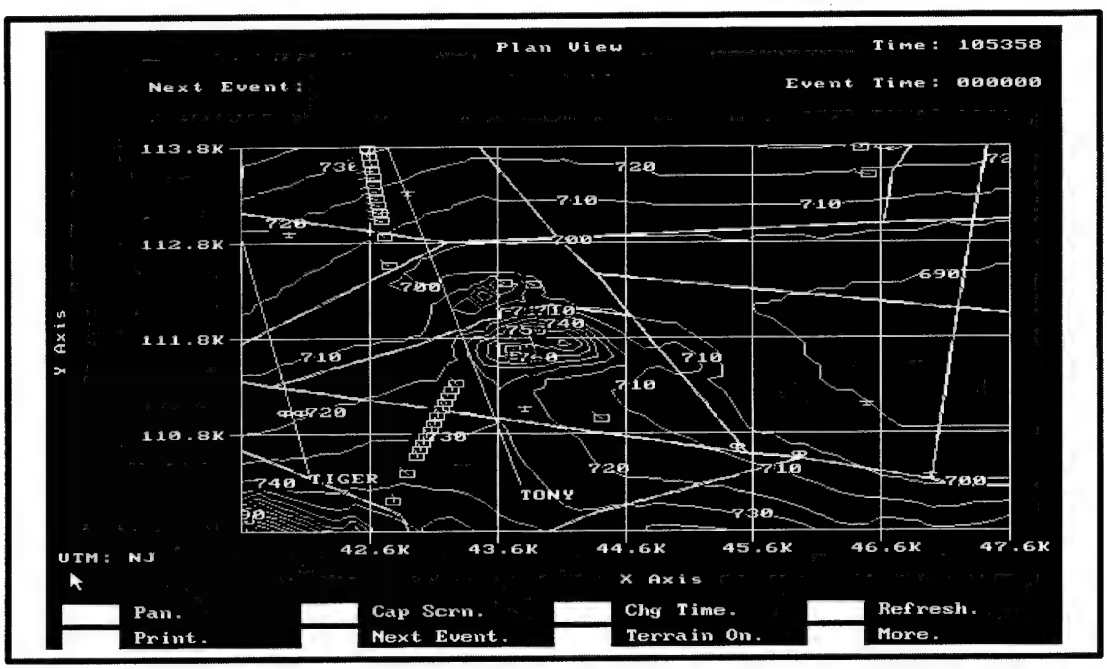

FIGURE 2. Plan View Display (UPAS Sample)
(Source: SIMNET Unit Performance Assessment System (UPAS) Version 2.5 User's Guide, Meliza & Tan, 1995)

3.2.1.2 Battle Flow Chart

The Battle Flow Chart (see Figure 3) is a time-dependent trace of a unit's movement during the exercise. This display allows the unit to see how and where individuals moved during the exercise. This allows the units to evaluate whether proper maneuver techniques were employed.

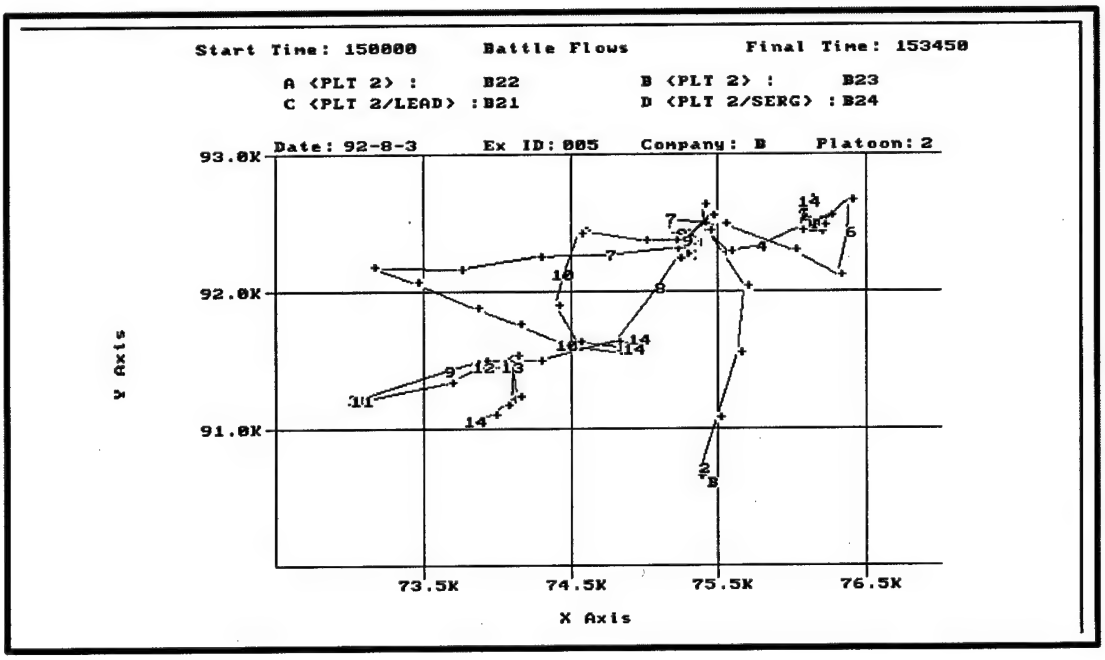

FIGURE 3. Battle Flow Chart (UPAS Sample).
(Source: SIMNET Unit Performance Assessment System (UPAS) Version 2.5 User's Guide, Meliza & Tan, 1995)

3.2.1.3 Battle Snapshots

Battle Snapshots (see Figure 4) show vehicle positions and gun tube orientation (if applicable) as specified time points in the simulation. This feature provides units with position information as well as orientation information. The Snapshot also has the capability to indicate line-of-sight between friendly and enemy vehicles. This capability can be used to assess the cover and concealment offered by a unit's halt positions, battle positions, and routes. (Meliza & Tan, 1995, Pg. 4)

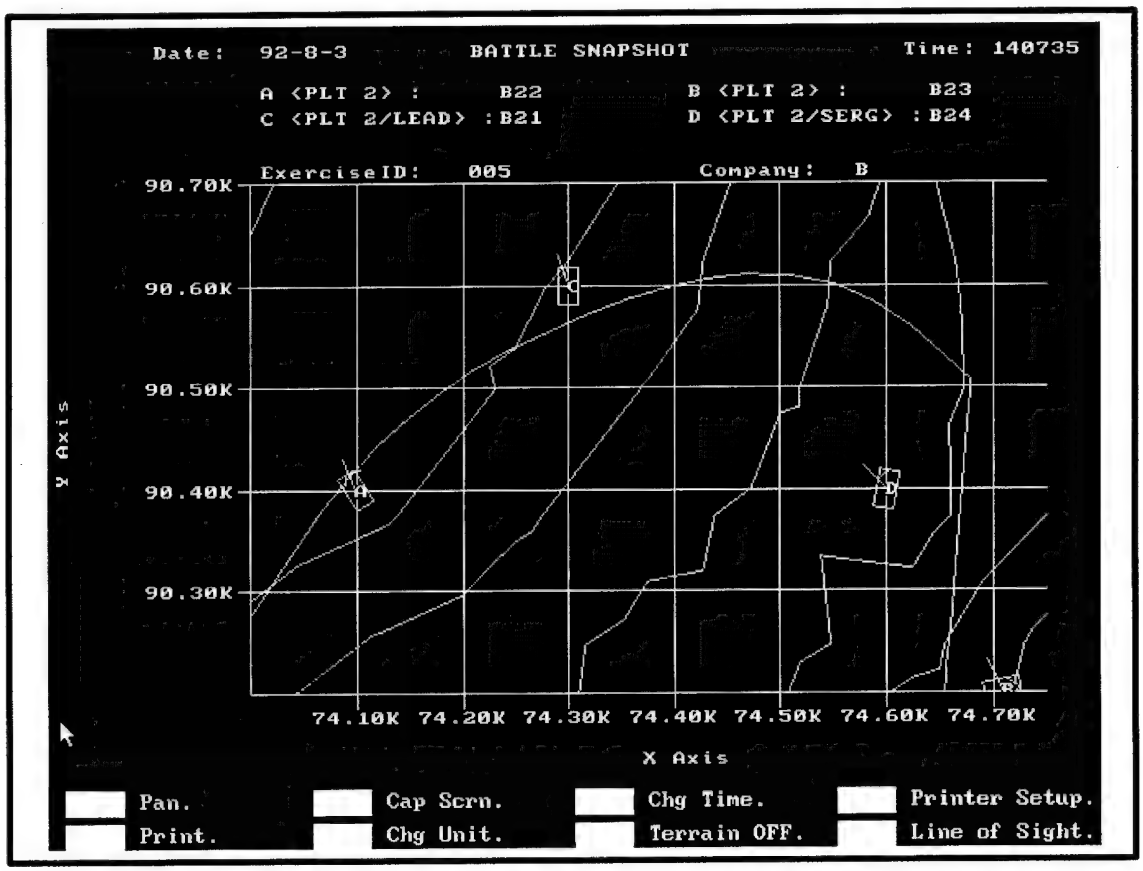

FIGURE 4. Battle Snapshot (UPAS Sample).
(Source: SIMNET Unit Performance Assessment System (UPAS) Version 2.5 User's Guide, Meliza & Tan, 1995)

3.2.1.4 Fire Fight Display

Fire Fight Displays (see Figure 5) allow the units and trainers to visualize how the exercising unit covered the battlefield with direct and indirect fires. This display is animated to cover a period of time selected by the O/C. Shot lines are shown extending from the originating vehicle to the point of impact. Hits and/or kills are shown as green lines and misses as white. Indirect fires are shown with a rectangle.

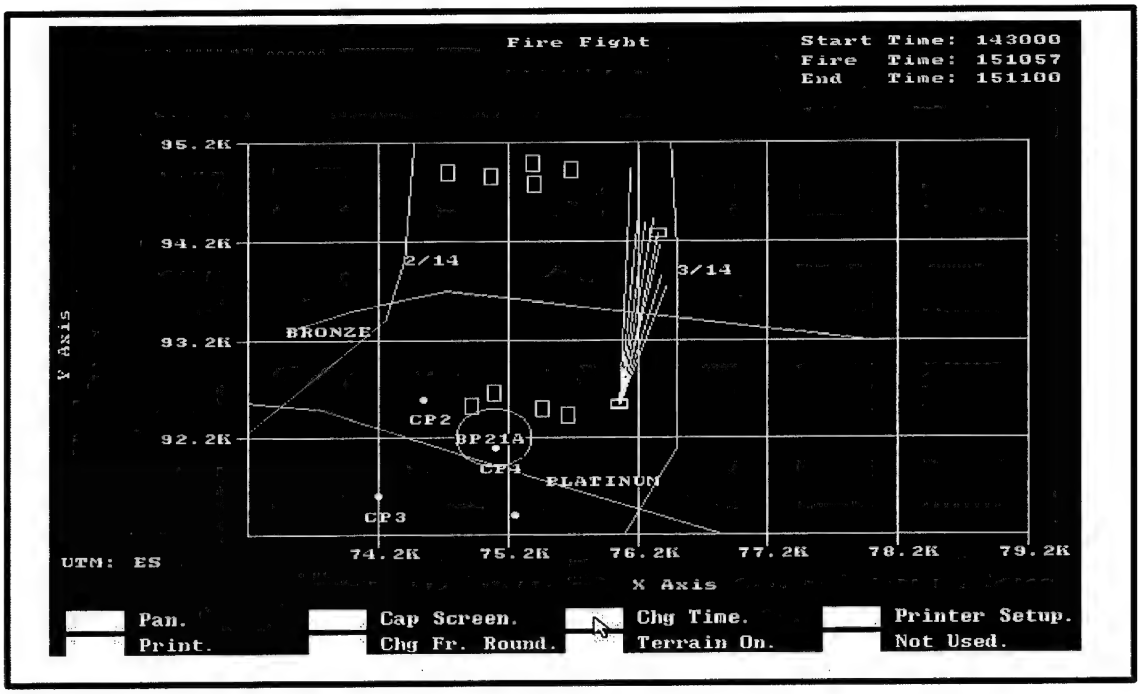

FIGURE 5. Fire Fight Display (UPAS Sample).
(Source: SIMNET Unit Performance Assessment System (UPAS) Version 2.5 User's Guide, Meliza & Tan, 1995, p. 61)

3.2.1.5 Exercise Timelines

Exercise timelines provide a time-correlated picture of what happened during the exercise. The exercise timeline shows how all exercise events relate to each other in a time sense.

3.2.2 Automated Training Analysis and Feedback System (ATAFS):

LB&M Associates, now Advancia Corporation, developed ATAFS via a series of Small Business Research Innovation (SBIR) contracts monitored by the Army Research Institute (ARI) and funded through STRICOM and ARPA. ATAFS was created to address shortcomings in the UPAS systems such as the time required to prepare displays, the inability to link radio transmission data to UPAS data, and no support for automatic data display selection (Brown, Wilkinson, Nordyke, Hawkins, Robideaux, & Huyssoon, 1996, and ARI, 1998). To facilitate AAR preparation, ATAFS employs a knowledge base to guide the creation of AAR aids. ATAFS uses a combination of automated data monitoring, for events with discrete start and end times and O/C observations, for events without easily identifiable start and end times, to create its AAR aids. The AAR aids created by ATAFS include:

- plan-view animation,
- snapshots,
- battle flow,
- firefight display, and
- statistical graphs, and tables.

Additionally, ATAFS can synchronize radio communications with the animated plan-view. To further aid O/Cs in AAR production, the O/Cs are able to add AAR discussion points directly on the ATFAS-generated AAR aids (Figure 6). ATAFS stores the AAR aids and allows the user to edit these aids before they are used to support AARs or loaded onto a videotape for use in the THP (Nordyke, John, personal communication, 10 Nov, 1998).

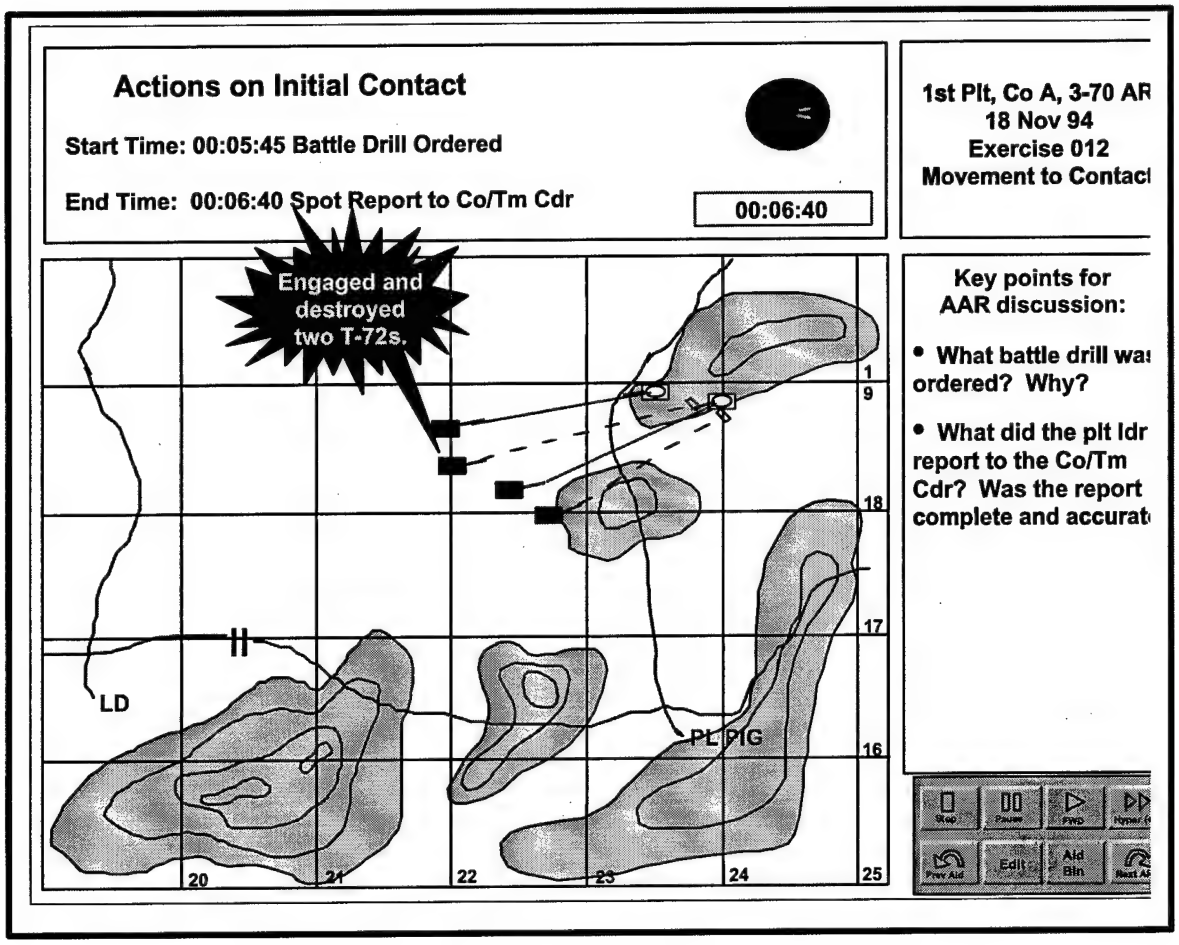

FIGURE 6. AAR Aid with Discussion Points (ATAFS Sample).
(Source: Brown, Wilkinson, Nordyke, Hawkins, Robideaux, & Huyssoon, 1996, Pg. 11)
Used by permission of Advancia Corporation.)

3.2.3 Training Analysis Repository and Graphical Evaluation Toolset (TARGET)

Initial work on Virtual Training Packages was conducted by Burnside, Leppert, and Myers, (1996) under the auspices of the US Army Research Institute for the Behavioral Sciences (ARI), which produced the *Virtual Training Program Orientation Guide.* The Virtual Training Repository (VTR) was developed with Defense Advanced Research Projects Agency (DARPA) funding under the Computer-Aided Training and Education Initiative (CAETI) program. TARGET (see Figure 7) was developed as a VTR tool to effectively analyze and visualize data from individual simulation exercises, and across exercises. TARGET provides tools, techniques and processes to conduct longitudinal studies across several exercises. TARGET uses graphic tools to display different Measures of Performance (MOPs). For example, TARGET tools include the following: bar charts, event-based timelines, a set of statistical analysis tools, a 2-D Battle Viewer, and a 3-D enhanced Battle Viewer for exercise playback (Loughran, Johnson, Kappel, & Stahl, 1997).

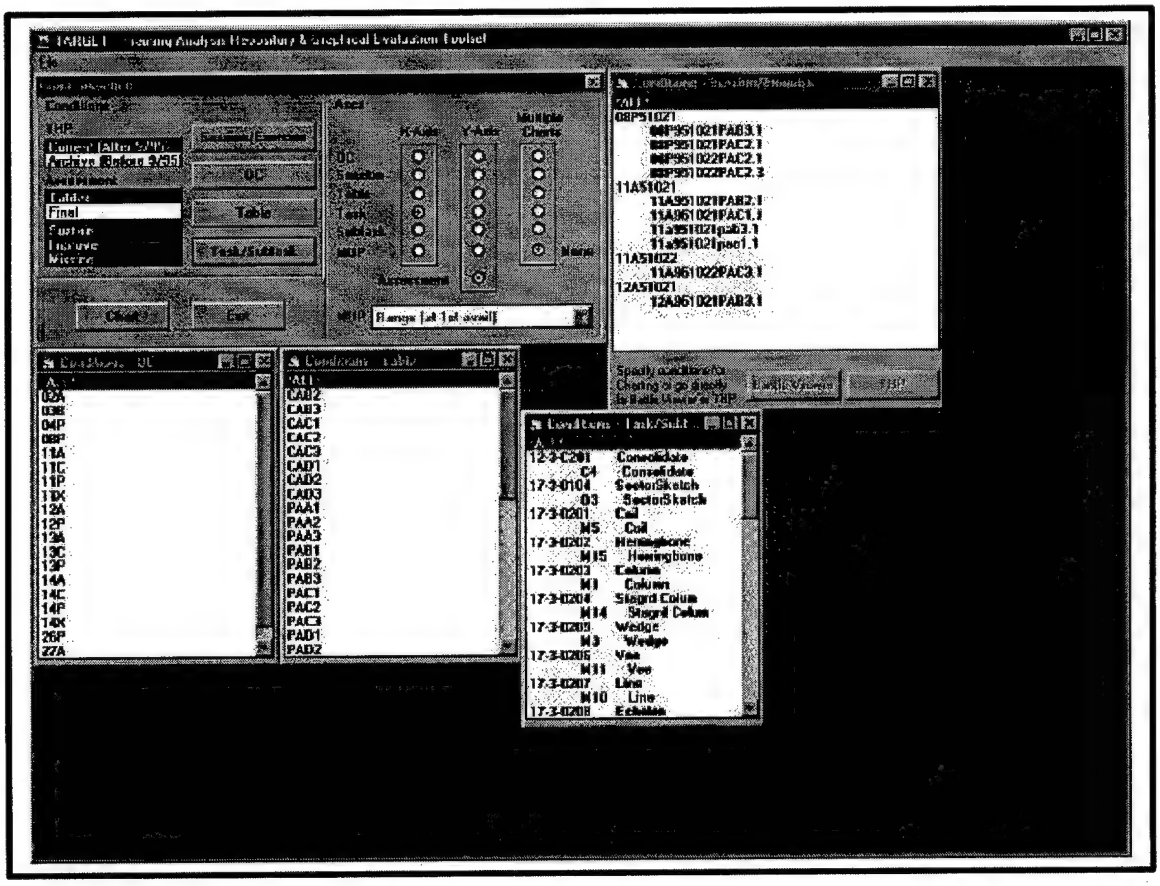

FIGURE 7. THP Screen (TARGET Sample).
(Source: Loughran, Johnson, Kappel, & Stahl, 1997)

TARGET uses THPs from the units exercising in the Virtual Training Program (VTP), developed by Burnside, Leppert, and Myers, (1996). The VTP THPs consist of a Microsoft Excel spreadsheet indexed by O/C team (see Figure 8). Each exercising platoon is provided with a set of prescribed training tables, with each table focusing on opportunities to train specific skills. For example, a particular table may call for the platoon to conduct a "hasty defense" and perform all the subtasks associated with a "hasty defense." During the training exercise the tables progress in complexity ("crawl-walk-run" philosophy). Additionally, the O/C can tailor the progression from table to table as the skill levels increase. This allows each platoon to train problem tasks that are unique to the unit. Regardless of the number of times the unit performs each table, each unit is provided only one THP. THPs have unit performance rated as one of the following:

I = Improve,
S = Sustain, or
N= Not Trained.

O/C comments are provided along with the task rating. In addition to the comments listed in the THP table, the O/Cs provide a comprehensive summary of general O/C comments and areas to improve and sustain. (See Figure 9 for a sample of freeform O/C comments.)

Task and Subtask	Page*	Combat Function Code	PAB 2	PAB 3	PAC 1	PAC 2	Final	Comments
17-3-0221 - Execute Actions on Contact	-	-	-	-	-	-	-	-
Tank commander who first observes the enemy takes action. *	5-85	A5	I	I	I	I	I	"Individual crews acted on contact properly, but no reports were going higher to the platoon leader or commander. By the time reports got to the commander, the platoon was decisively engaged or destroyed."
"The remainder of the platoon, upon seeing other vehicle(s) engage and hearing the contact report, takes action. "	5-85	A6	S	S	S	S	S	-
Platoon sends a contact report to the commander.	5-86	C5	S	S	S	S	S	-
Platoon sends a complete spot report to the commander. *	5-86	C6	I	I	I	I	I	"Throughout the exercise, the platoon leader had problems with acquiring the information from his TCs to send an accurate situation report to the commander."
Platoon leader directs a platoon battle drill.	5-86	C9	S	S	S	S	S	-

FIGURE 8. THP Spreadsheet (TARGET Sample)
(Available: http://www.ida.org/DIVISIONS/csed/vtr/aboutData.html)

Observer/Controller Comments - 08p51021

1. O/C. SFC MAHNS

2. General. 1st Platoon __ conducted the Virtual Training Program (VTP) familiarization course, a modified fundamental table and platoon level offensive missions. The platoon was scheduled to conduct the familiarization table and several offensive exercises. During the introductory briefing and subsequent inquiries with platoon members it was determined that the platoon was not prepared to conduct the missions planned without some rudimentary training. Few members of the platoon were familiar with the platoon's Standard Operating Procedure (SOP). Only two members had been in simulators. The platoon had not practiced movement techniques recently. After conferring with the platoon leader and the tank commanders it was decided that we would conduct the familiarization course, followed by some basic tactical movement subtasks, before starting the offensive exercises

3. Strengths to Sustain.

Cross-talk. After some coaching the platoon became very efficient at using cross-talk to enhance their performance.

Attitude. Even though the platoon had to repeat tasks several times, they maintained a positive attitude and open minds.

Crew duties. Tank crewmembers worked as a team.

4. Areas Improved during SIMNET Training.

Movement Techniques. The platoon learned some very valuable lessons about maneuvering as a platoon and have a good base on which they can build.

Executing battle drills. Battle drills became smoother by the end of the session, but still need work.

5. Areas to Improve.

Command-Control-Communication. The platoon's tank commanders have varying degrees of experience in armor platoon tactics. The platoon leader has to ensure that his tank commanders are very familiar with the tactical SOP. The platoon never fought as a platoon, but as four separate tanks. The PSG was slow to send spot reports to the commander. Reports sent were not in the proper format.

Battle Drills/Actions on Contact. The platoon leader had a good concept of what actions needed to take place. He had a difficult time issuing the proper commands in a timely fashion. There was confusion initially concerning the proper format and actions to be taken when the platoon made contact with aircraft.

Knowledge of Platoon SOP. This platoon has the intelligence base and desire to become an effective arm of combat decisiveness with proper training. The platoon must spend more time studying FM 17-15 *Tank Platoon* and FKSM 17-15-3, *Tank Platoon SOP.* All platoon members must know and understand their platoon SOP.

FIGURE 9. O/C Summary Comments (TARGET Sample)
(Available: http://www.ida.org/DIVISIONS/csed/vtr/data/thp/html/02A60224.html)

3.2.3.1 2-D Battle Viewer

The 2-D Battle Viewer (Figure 10) is a TARGET application that provides the capability to play back the exercise from an overhead point-of-view. A 2-D terrain map with orientation grids (currently the National Training Center) is displayed. The details of the terrain features (e.g., elevation, soil types, and roads) are derived from Modular Semi-Automated Forces (ModSAF) files and are graphically displayed. Each vehicle's route is plotted as a solid line (Blue platoon's vehicles are individually color-keyed) on the terrain map. In addition to the routes, all shots are plotted as dotted color-keyed lines. The results of each shot are also indicated. In the viewer the map may also be scaled, and any of the marker features may be toggled on or off. To compare various trials of the same training table, the 2D Battle Viewer is capable of replaying several trials at the same time.

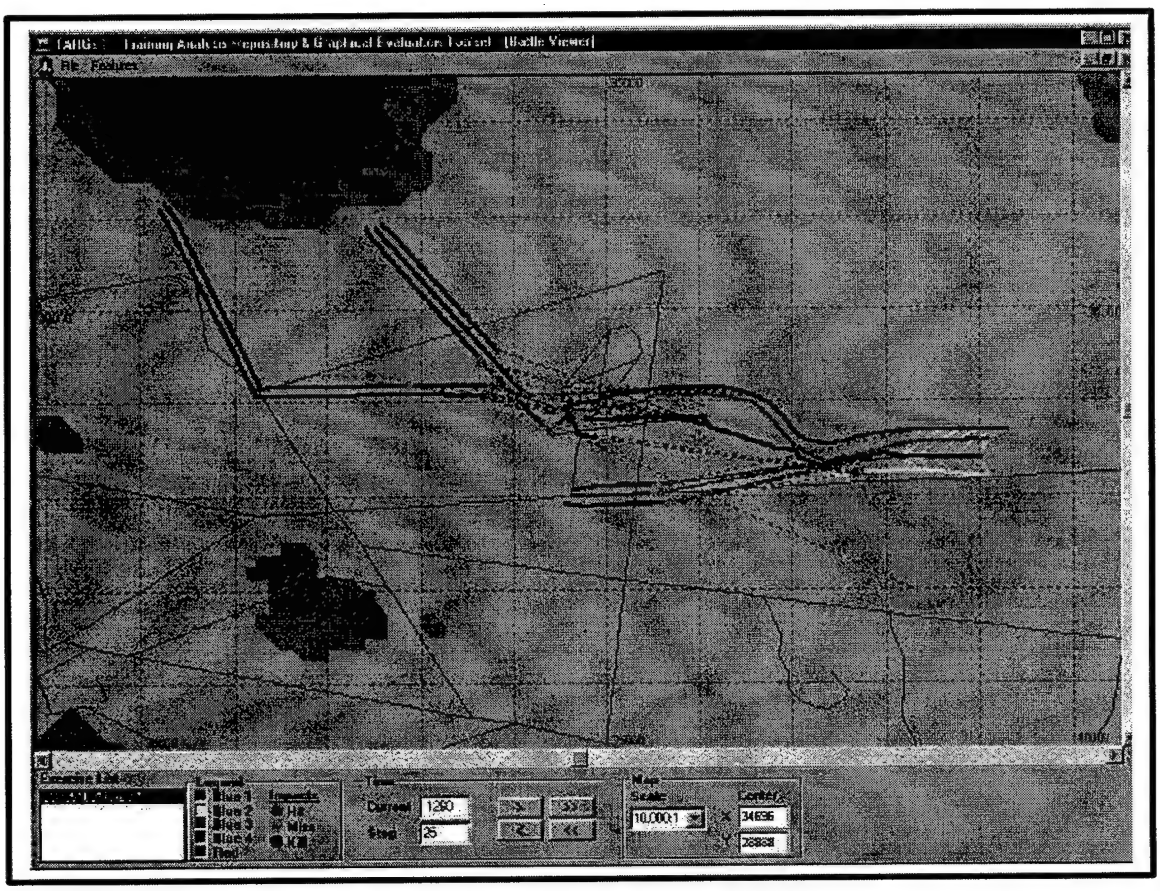

FIGURE 10. Screen Image of 2D Battle Viewer (TARGET).
(Source: Loughran, Johnson, et al, 1997)

3.2.3.2 3-D Enhanced Battle Viewer

Advancing technology has provided low-cost personal computers with the capability of displaying graphics that had previously only been available on high-end UNIX computers. Along with this capability, TARGET has developed a prototype 3-D enhanced Battle-Viewer that utilizes ***Virtual Reality Modeling Language*** (**VRML**) to display 3-D images of the exercise. Units are able to access and

replay the simulation through the 3-D Battle Viewer from their home-station via the Internet. Currently the 3-D enhanced Battle Viewer consists of a VRML plug-in for web browsers. This allows the person viewing the replay to "move" around the scene and watch the engagement from different points of view. The principals in the simulation replay are generic polygon vehicles showing both hull and gun tube orientation. As the scenario progresses, any firing conducted by the tanks is displayed as a shot leaving the tube. In addition to the fire visualization, firing statistics (total rounds fired, hits and misses) are displayed above the image of the tank.

3.2.4 National Training Center Instrumentation System (NTC-IS)

In the late 70s and early 80s the Army identified a need to train in a live, force-on-force environment. The National Training Center (NTC) at Ft. Irwin, CA was developed, in 1982, as a direct result of this realization. Heavy units deploy to the NTC to conduct the most realistic training possible, focusing on medium-to-high-intensity conflict in the desert, that the US military has to offer. In contrast to ModSAF, the NTC allows units to conduct training against live, thinking foes, trained to fight according to existing enemy doctrine. The success of the NTC led to the development of other live training facilities tailored to different units and missions, e.g., the Joint Readiness Training Center (JRTC) at Ft. Polk, used by light forces, and the Combat Maneuver Training Center, Hoenfels, Germany, which allows units to train in European scenarios.

The NTC THP consists of two portions, a written portion and a videotape portion. A survey conducted by Fobes and Meliza (1988) discovered that, at the time it was conducted, the written portion of the THP was considered ineffective in supporting sustainment training at the unit's home station. "Commanders reported the written portion of the THP does not effectively support post-rotational corrective and sustainment training at home station" (Fobes & Meliza, 1988). On the other hand, the videotape portion of the THP was considered a useful tool for home station sustainment as well as pre-rotational planning.

In line with these observations the NTC-IS is designed to increase the effectiveness of the THP by adding several multimedia aspects to the package. "The multimedia AARs and the THP of unit performance are key components of the combat training center experience. The NTC-IS will collect, process, analyze, and display training performance data to support the preparation of AARs and the THP. The multimedia AARs and THP are valuable sources of data for the Army Lessons Learned Program." (DA, 1995a). The NTC-IS operational requirement document listed the necessary AAR and THP capabilities as follows:

> Information presentation capabilities must support activities to present training performance information to rotational units in the multimedia AARs and THPs. The NTC-IS must:
> - present prepared training performance feedback during multimedia AARs conducted in mobile facilities in multiple field locations;
> - present prepared training performance feedback during multimedia AARs conducted in fixed facilities in the cantonment area;
> - replay prepared voice, video, and digital training performance information in the multimedia AAR facilities on command;
> - replay the exercise history in the multimedia AAR facilities on command;
> - record audio and video portions of multimedia AARs (both system-and audience-generated) for inclusion in the THP; and
> - prepare the THP for delivery to the rotational unit in hard copy and removable electronic media. (DA, 1995a)

3.3 Research on THP Effectiveness

We discovered only one published study during the period 1987 – 1998 that documented findings regarding the effectiveness of military training AAR THPs. THPs seem to have been overlooked by the training evaluation researchers, for the most part. The single study covering THP effectiveness was limited to THPs developed at the NTC. Fobes and Meliza (1988) conducted a survey of commander of most echelons from three divisions rotating through the NTC. These commanders were queried on THP effectiveness during a two-month period during 1987. Fobes and Meliza concluded from this limited NTC study that the written portion of the THP is almost never used due to its length and lack of specific recommendations, while the video portion was used for several purposes.

> Commanders [surveyed] reported that written portion of the THP does not effectively support post-rotational corrective and sustainment training at home station. Users indicated this material is too extensive and complex, contains many inconsistencies, and lacks specific recommendations for corrective training. (Fobes & Meliza, 1988, p. viii)

Although AAR and THP technology has changed greatly since this NTC study was conducted, the lessons learned are probably still applicable to the THP. Recent evidence reinforces the conclusions made in that study. In a personal communication Julia Loughran on the DARPA VTR project team states "… while we did this project, we heard from a number of people that THPs were never looked at again after a training event." (Loughran, Julia, personal communication, December 30,1998). Additionally, Ford, Huffman, & Creen (1996) state:

> Unfortunately, however, the full benefits of the feedback information are not realized. At the unit level brigade and battalion commanders typically move to other assignments before they design training to sustain strengths and correct weaknesses; and their replacements are frequently disinclined to work through previous THPs to extract the detailed evaluations they contain.
>
> Even analysts who are highly motivated to extract information from THPs must spend much of their time structuring the information to make it accessible.... Much of the information that is available in the THP is not suitable for quantitative analysis that considers several rotations. (Pg.1)

While the Ford, Huffman, & Creen (1996) study was not explicitly studying the effectiveness of the THP, its observations tend to confirm the shortcoming identified by Fobes and Meliza (1988). Likewise, in stating reasons for commissioning the present literature review, Dr. Mona Crissey stated, "In all my travels [to simulation and military training sites], take-home packages of past exercises … seem to be a (Crissey, Dr. Mona, personal communication, August 6, 1998). Dr. Crissey had hoped that this literature search would have uncovered other studies that would point the way to improving the THP. Thus, these informal comments tend to validate the need to conduct a study of current THPs to determine how they can be improved.

Shlecter, Shadrick, Bessemer, & Anthony (1997) reported a related finding through their examination of the effects of units' home-station preparation upon their Virtual Training Program (VTP) activities and effects of the VTP on platoons and their unit leaders. Specifically, the participants responses indicated that the VTP had a significant, though modest, impact upon VTP-experienced unit leaders' sense of

confidence in their own and their unit's tactical proficiency. The instructors' responses suggested that the VTP had a salient effect upon the tactical skill proficiency of the sampled unit leaders. Thus, home-station preparation did have an impact upon the training participants' VTP performance.

4. DISCUSSION AND CONCLUSIONS

Concentrating on studies conducted since 1987, this *search and summary* identified only one document in the scientific and technical (S&T) literature explicitly reporting on the effectiveness of military training AAR THPs. The report by Fobes and Meliza (1988) summarizes their survey of commanders from several echelons of three divisions rotating through the NTC on the effectiveness of the standard NTC THP. While the survey is on THP products produced with the technology available at that time, and the sample size and location are limited, the observations on potential improvements to THPs may still be applicable. Other informal observations by Ford, Huffman, & Creen (1996), Loughran (personal communications, 1998), and Crissey (personal communications, 1998) tend to confirm the need for improvement of THPs.

Fobes and Meliza (1988) indicated that at that time the written portion of THPs did not satisfactorily address performance strengths and weakness. Consequently, THPs did not provide information necessary to identify areas for corrective training. On the other hand, Fobes and Meliza point out that the take-home videotaped segments were widely used. At that time, the video sections were used from brigade through company levels and were frequently borrowed as preparatory training for units planning to go to the NTC. In addition to being used by the reviewed unit, the videotaped segments were used as pre-rotation training aids for other units scheduled for the NTC. The interviewed commanders suggested reducing the size and complexity of the THP. They suggested condensing the written portion to a few bullets covering mission outcome, major strengths and weaknesses, critical underlying events, and specific training recommendations. The only change to the visual portion suggested was the inclusion of paper copies of the AAR briefing slides.

Going further, Fobes and Meliza (1988) suggested a more structured approach to the written portion of the THP, with each mission to be evaluated according to each echelon's Mission Essential Task List (METL). Since each METL is divided into critical tasks, mission success or failure can be traced to its critical task. This type of mission decomposition allows the underlying factors for each mission success or failure to be identified, which in turn allows specific training recommendations to be developed. Similarly, Dr. Crissey (personal communication August 6, 1998) observed from her experience visiting military simulation and training sites, "What commanders really use is the results of the task evaluations as the start point for planning new work [training initiatives]." These more recent observations now have the benefit of operating in a METL-oriented training environment, as Fobes and Meliza had suggested in 1988. With the pervasive use of METLs for training, perhaps the time for a reassessment of THP usefulness has now arrived.

Another observation of this *search and summary* is that the line separating AAR and THP capabilities is beginning to evaporate with the advent of more-advanced and less-expensive graphics technology. The multimedia capabilities of the THP, which were, at one time, only available on high-end graphics workstations are now available to most personal computers, and therefore available to more of the training population. This allows THP systems to include more data displays for easier use in the THP. The WWW will also play a role in advancing the capabilities and effectiveness of the THP. Internet-based THP systems, such as the TARGET database and other newer systems will allow any authorized units access to all the training data across exercises, not just their own. This capability will allow them to see how their unit compares with others participating in similar exercises and to examine alternative solutions.

Lacking a current, comprehensive study of THP effectiveness, and since considerable effort is expended to produce THP products, it seems appropriate to conduct a new study of THP effectiveness to ensure

maximum utility from this important potential training product. This proposed study on the effectiveness of the THP could be conducted via a structured and open-ended survey of commanders and other selected participants from units participating in a variety of exercises (live, constructive, and simulation). All facets of the THP could be addressed to determine the

- extent of use for the various types of THP products,
- most effective methods and uses of THPs, and
- desired improvements to and configurations of THPs that would encourage field use.

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ABOUT THE UDRI HUMAN FACTORS GROUP

The University of Dayton Research Institute (UDRI) Human Factors Group, experienced engineers and psychologists, specialize in the development and application of human factors and ergonomics. In addition, we focus on human factors aspects of aeronautical and training systems and their logistical implications. In the vision of the Human Factors Group partners, a common ground exists for academic, government, industry, and defense human factors analysis and design activities. We are affiliated with accredited human factors programs and faculty at the University of Dayton in Dayton, Ohio. We provide an academic leveraging basis and presence in a major human factors and ergonomics geographical center. Our personnel are located on the University of Dayton campus and at the nearby Wright-Patterson Air Force Base.